Name:

at1124exam: Radicals and Squares (v901)

Question 1

Simplify the radical expressions.

$\sqrt{63}$ $\sqrt{50}$ $\sqrt{27}$

$\sqrt{3 \cdot 3 \cdot 7}$ $\sqrt{5 \cdot 5 \cdot 2}$ $\sqrt{3 \cdot 3 \cdot 3}$

$3\sqrt{7}$ $5\sqrt{2}$ $3\sqrt{3}$

Question 2

Find all solutions to the equation below:

$$\frac{(x-5)^2}{3} + 2 \; = \; 14$$

First, subtract 2 from both sides.

$$\frac{(x-5)^2}{3} = 12$$

Then, multiply both sides by 3.

$$(x-5)^2 = 36$$

Undo the squaring. Remember the plus-minus symbol.

$$x - 5 = \pm 6$$

Add 5 to both sides.

$$x = 5 \pm 6$$

So the two solutions are $x = 11$ and $x = -1$.

Question 3

By completing the square, find both solutions to the given equation. *You must show work for full credit!*

$$x^2 - 6x \;=\; 27$$

$$x^2 - 6x + 9 = 27 + 9$$
$$x^2 - 6x + 9 = 36$$
$$(x-3)^2 = 36$$
$$x - 3 = \pm 6$$
$$x = 3 \pm 6$$
$$x = 9 \qquad \text{or} \qquad x = -3$$

Question 4

Any quadratic function, with vertex at (h, k), can be expressed in vertex form:

$$y \;=\; a(x-h)^2 + k$$

A quadratic function is shown below in standard form.

$$y \;=\; 2x^2 - 16x + 39$$

Express the function in **vertex form** and identify the **location** of the vertex.

From the first two terms, factor out 2 .

$$y = 2(x^2 - 8x) + 39$$

We want a perfect square. Halve -8 and square the result to get 16 . Add and subtract that value inside the parentheses.

$$y = 2(x^2 - 8x + 16 - 16) + 39$$

Factor the perfect-square trinomial.

$$y = 2((x-4)^2 - 16) + 39$$

Distribute the 2.

$$y = 2(x-4)^2 - 32 + 39$$

Combine the constants to get **vertex form**:

$$y = 2(x-4)^2 + 7$$

The vertex is at point $(4, 7)$.